

REMARKS

The Office Action dated April 5, 2007 has been received and carefully noted. The above amendments to the claims, and the following remarks, are submitted as a full and complete response thereto.

In accordance with the foregoing, claim 3 has been amended to improve clarity of the features recited therein. No new matter is being presented, and approval and entry are respectfully requested. As will be discussed below, it is also requested that all of claims 1-9 be found allowable as reciting patentable subject matter.

Applicant gratefully acknowledges the indication in the Office Action that claims 5-7 and 12-14 would be allowable if rewritten into independent form. However, as discussed below, Applicant respectfully submits that these claims are allowable in their present form.

Claims 1-14 are respectfully submitted for consideration.

REJECTION UNDER 35 U.S.C. § 112:

In the Office Action, at page 2, claims 3, 4, 7, 10, 11, and 14 rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness.

In response, the claims have been amended to improve clarity and antecedent support. Support for the amended recitations may be found, at least, in paragraph [0046] of the specification of the present application and FIG. 4

Accordingly, it is respectfully requested that the § 112, second paragraph rejections to the claims be withdrawn.

REJECTION UNDER 35 U.S.C. § 103:

In the Office Action, at page 2, claims 1-4 were rejected under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent No. 6,385,331 to Harakawa et al. ("Harakawa") in view of U.S. Patent No. 6,553,281 to Liu ("Liu"). The Office Action took the position that Harakawa and Liu disclose all the aspects of independent claim 1 and related dependent claims 2-4. In particular, the Office Action contended that Harakawa describes all the recitations of independent claim 1 except for detecting the direction in which the human being is pointing based upon the head position. Accordingly, the Office Action relied on Liu as curing the deficiencies of Harakawa. The rejection is traversed for at least the following reasons.

Independent claim 1, upon which claims 2-14 are dependent, recites a pointing position detection device which detects the presence of a human being from an image which is photographed by a plurality of cameras, and which detects a position at which the human being is pointing. The device includes a section which detects a head position of the human being, including at least distance information, based upon the image, a section which detects a hand position of the human being, including at least distance information, based upon the image, and a section which calculates a position of a hand tip

and a main axis of the hand, based upon the hand position which has been detected. The device also includes a section which detects a direction in which the human being is pointing, based upon the head position which has been detected and the position of the hand tip and the main axis of the hand which have been calculated. The position at which the human being is pointing is detected, based upon the detected direction in which the human being is pointing.

As will be discussed below, Harakawa and Liu fail to disclose or suggest the elements of any of the presently pending claims.

Certain embodiments of the present invention advantageously provide a pointing position detection device which makes it possible for a human being to perform pointing operation in a natural manner and also to perform pointing position detection at high accuracy, and also to provide an autonomous robot which initiates behavior based upon the results of pointing position which have been thus detected. Furthermore, since it is arranged for the position which is being pointed to be detected based upon the main axis of the hand, it becomes possible to detect the position which is being pointed with high accuracy, even if the arm is bent. The combination of the cited references fails to disclose or suggest all of the elements of any of the presently pending claims, and, thus, fails to provide these critical and non-obvious advantages.

Harakawa generally describes illuminating means for illuminating a person to be recognized; a plurality of image pickup means for picking up the image of the person to be recognized, who is illuminated by the illuminating means from different directions;

determining means for extracting an image part corresponding to the person to be recognized from a plurality of images based on a plurality of images of situations picked up by the plurality of image pickup means, the situations being indicative of the person to be recognized pointing to either a specific position or a specific direction, and for determining either the position or the direction pointed to by the person to be recognized. See column 9, line 57, to column 10, line 3. For example, the tip of the hand, the finger or the like of the person to be recognized or the point corresponding to the tip or the like of a pointer held by the person to be recognized can be used as the feature point. See column 11, lines 20-24. Harakawa also provides determining three-dimensional coordinates of the feature point whose position is changed when the person to be recognized bends or extends an arm and the three-dimensional coordinates of a reference point whose position is not changed even if the person to be recognized bends or extends an arm. See column 10, lines 58-63. For example, a point corresponding to the body (such as the chest and the shoulder joint) of the person to be recognized can be used as the reference point. See column 11, lines 24-27. The position or direction pointed to by the person to be recognized is determined from the positional relationship between the reference point and the feature point.

However, Harakawa does not teach or suggest, at least, “a section which detects a direction in which the human being is pointing, based upon the head position which has been detected and the position of the hand tip **and the main axis of the hand which have been calculated,**” emphasis added, as recited in independent claim 1. Although

Harakawa provides that the three-dimensional coordinates of the feature point and a reference point and lattice points extracted from an image (See column 21, line 31, to column 22, line 9) are determined, Harakawa is devoid of any teaching or suggestion that the direction in which the human being is pointing is based upon the determination of that main axis of the hand.

Furthermore, Liu does not cure the deficiencies of Harakawa. Instead, Liu simply provides that to estimate a fixation point 3 of an object viewed by a person 2 **on an image screen 1 of a work station computer**, the fixation point 3 being understood to be the point on the image screen 1 impinged by the gaze line 4 of an eye 5 of the person 2, there is provided an eye reference point detection device equipped with an eye reference point detector 6. (Emphasis added). See column 3, lines 40-60. By means of the eye reference point detector 6 it is possible, within a predetermined spatial range, to monitor, and store as image data in a head image storage 7, for instance the head and shoulder portion of the person 2. The head image storage 7 is connected to a surface eye reference point determining unit 8 of the eye reference point detection device which serves to define an eye reference point from the image data of the head image storage 7.

As can be clearly appreciated from the description provided in Harakawa, this reference is also silent as to teaching or suggesting that the direction in which the human being is pointing is based upon the determination of that main axis of the hand. Liu explicitly focuses on detecting a fixation point on a computer screen. A determination of

the main axis of the hand does not appear to be needed in Liu to achieve its intended purpose.

Contrary to the contentions made in the Office Action, a person of ordinary skill would not be motivated to combine the descriptions of both, Harakawa and Liu. Harakawa's configuration appears to provide a hand pointing apparatus for picking up a person to be recognized and for determining a position or a direction pointed to by the person to be recognized. Liu, in contrast, has nothing to do with determining a position or a direction pointed to by the person to be recognized. Instead, Liu's configuration appears to provide an eye detector to estimate a fixation point of an object viewed by a person on an image screen of a work station computer. A person of ordinary skill in the art would not have been motivated to combine the descriptions of Harakawa and Liu as both references provide a completely different configuration and purpose.

Therefore, in light of the above, Applicants respectfully submit that a combination of Harakawa and Liu would fail to teach or suggest all the recitations of independent claim 1. It is respectfully requested that independent claim 1 and related dependent claims be allowed.

CONCLUSION:

In view of the above, Applicant respectfully submits that the claimed invention recites subject matter which is neither disclosed nor suggested in the cited prior art. Applicant further submits that the subject matter is more than sufficient to render the

claimed invention unobvious to a person of skill in the art. Applicant therefore respectfully requests that each of claims 1-14 be found allowable and this application passed to issue.

If for any reason the Examiner determines that the application is not now in condition for allowance, it is respectfully requested that the Examiner contact, by telephone, the Applicant's undersigned attorney at the indicated telephone number to arrange for an interview to expedite the disposition of this application.

In the event this paper is not being timely filed, the Applicant respectfully petitions for an appropriate extension of time.

Any fees for such an extension together with any additional fees may be charged to Counsel's Deposit Account 50-2222.

Respectfully submitted,


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